DRAFT

2005 Interim Guidelines For Community Wastewater Discharge

with Background and Rationale for the

Draft 2005 Interim Guidelines for Community Wastewater Discharge

Whitehorse Sewage Lagoon, May 2005

Yukon
Environment

2005 Interim Guidelines for Community Wastewater Discharge

Introduction

The Yukon government has started a two part review and public consultation of proposed guidelines to facilitate construction and management practices for municipal wastewater treatment systems. The term 'municipal' covers all unincorporated and incorporated Yukon communities in the territory.

Phase one involves consultation with key stakeholders to obtain their initial feedback and recommendations. This will be followed by a public review of the proposed changes.

The current guidelines have been in place since 1983 when the Yukon Water Board issued the "Guidelines for Municipal Wastewater Discharges in the Yukon Territory" to help communities in their planning and design of upgrades to their municipal wastewater treatment system.

The Water Board's guidelines identified conditions and municipal wastewater quality objectives that it considered appropriate for Yukon communities.

Scientific and environmental research has advanced significantly over the past 20 years and various northern and provincial governments have updated their guidelines during that time. The Yukon Water Board has not referenced the 1983 guidelines, to a great degree, in its more recent decisions on municipal wastewater treatment.

The 2003 devolution of Yukon's land and water resources transferred the care and control of water resources from the federal government to the Yukon government.

New guidelines are proposed to help communities in the design and planning of new and upgraded sewage treatment systems that are anticipated between now and 2007 when a Canada-wide Strategy currently in development is scheduled for release.

These proposed 2005 Interim Guidelines for Community Wastewater Discharge (the Guidelines) reflect the view that technology and performance objectives should reflect northern circumstances, be proven to work under northern conditions, and offer economic balance in terms of both capital and operation and maintenance costs.

The proposed Guidelines reflect current wastewater treatment objectives that can be reasonably achieved using practical, proven waste treatment technology. It should be noted that regulators may vary the requirements that may have to be met, under certain site-specific conditions. These Guidelines may be revised in the future to reflect changes in technology or an increased understanding of the effects from municipal wastewater discharge.

They are a useful reference for regulators, government agencies, First Nations, special interest groups and the general public in terms of clarifying the expected wastewater

treatment objectives that municipalities should meet. These Guidelines do not absolve proponents from having to comply with legislation. In the event of a variance between these Guidelines and legislative requirements, legislative requirements take precedence.

The following sections describe the proposed objectives that wastewater treatment systems should achieve in terms of: Treatment; Conditions for Discharge to Surface Waters; Wastewater Quality Objectives; Monitoring & Sampling; and Contingency Planning.

1. Objectives

Municipal wastewater should be treated and discharged in a manner that meets the following objectives:

1.1. Treatment

1.1.1. All municipal wastewater should be treated prior to discharge to ground and/or surface water.

1.1.2. Conventional secondary treatment should be the minimum treatment, with additional treatment where required.

1.2. Conditions for Discharge to Surface Waters

1.2.1. Rates of discharge should allow adequate assimilation capacity in all receiving water flows.

1.2.2. Discharge to surface waters should be engineered to facilitate rapid mixing.

1.2.3. The appropriate CCME Environmental Quality Guideline for instream and downstream users should be met below the mixing zone.

1.3. Wastewater Quality Objectives

1.3.1. All wastewater discharged to surface waters should meet the following wastewater quality objectives unless site-specific conditions warrant otherwise[1]:

Parameter	Maximum Value	Units
Biochemical Oxygen Demand	45	Milligrams per liter
Total Suspended Solids	60	Milligrams per liter
pH	6 to 9	Units
Oil and Grease	No visible sheen	
Fecal Coliform bacteria	20,000	Counts per 100 Milliliter
Toxicity[2]		

[1] The environmental and regulatory review of a specific proposal may recommend or require that different objectives than those listed here be used, or that there be requirements for limits for additional parameters not listed here, such as nutrients and surfactants.

[2] Testing for and management of direct toxicity of municipal wastewater to aquatic life is under review by federal/provincial/territorial jurisdictions. Presently, compliance with section 36(3) of the *Fisheries Act*, regarding the prohibition for the deposit of a deleterious substance, relies on a standard fish bioassay called the 96-hour acute lethality test (96 hr LC 50). Uncertainty about how this may be applied in future in a new federal fisheries regulation on municipal wastewater (anticipated once the Canada-wide Strategy is completed in 2007) resulted in a decision not to recommend a toxicity measure at this time.

1.4. Monitoring & Sampling

1.4.1. Facilities should be designed, constructed and operated to allow safe sampling and flow measurement.

1.4.2. Sampling should be conducted frequently enough to assure that licence conditions are being met during the period of discharge to the receiving environment.

1.4.3. Wastewater treatment facilities should be inspected in a manner and frequency to ensure proper operation.

1.5. Contingency Plans

1.5.1. Contingency plans to respond to upsets, breakages, and malfunctions should be prepared and followed for wastewater treatment facilities.

Contacts

For further information on these Guidelines or for information on Yukon's water resources please contact:

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Background and Rationale for the

Draft 2005 Interim Guidelines for Community Wastewater Discharge

This Background and Rationale document has been developed to accompany the draft 2005 Interim Guidelines for Community Wastewater Discharge (the Guidelines) for the purpose of providing background or rationale for the specific sections in the Guidelines. The Background and Rationale document will not be part of the Guidelines once finalized.

Introduction

A good example of progress in treating municipal wastewater is Whitehorse's sewage lagoon facility as showcased on the cover page of the Guidelines. Most Yukon communities use sewage lagoons to achieve a high level of treatment where long-term storage cells are discharged to ground or wetlands. The Faro and Old Crow lagoons may discharge seasonally to rivers. Two communities (Carmacks and Dawson) use mechanical sewage treatment plants and continuously discharge effluent to surface water. The Carmacks sewage treatment plant is a secondary facility, which is becoming aged and has experienced some operational problems. The Dawson sewage screening plant is a primary treatment facility. Both communities are planning to upgrade sewage treatment to a reliable, secondary standard.

The draft Guidelines are based on the Water Board's 1983 "Guidelines for Municipal Wastewater Discharges in the Yukon Territory"[1] and the standards generally adopted by other Canadian jurisdictions (see Table 1: Summary of Wastewater Quality Standards in Yukon and Other Jurisdictions). The proposed objectives are generally in line with the recommendations from the "Review of Yukon Water Board's Guidelines for Municipal Wastewater Discharges" draft of December 16, 2003 prepared by G.J. Bull and Associates Inc. and Novatec Consultants Inc. for the Yukon Government[2].

Notwithstanding the progress made to date in upgrading municipal wastewater treatment systems, the Yukon Government desires clear, up-to-date Guidelines for proponents and stakeholders to refer to when assessing or upgrading municipal systems. With the Yukon Government assuming care and control of the Yukon's water resources at devolution, it is important that the government show diligence in providing clear direction and guidance as it relates to infrastructure development and environmental protection. Further, the guidelines should seek a balance with affordability, both for capital and O&M costs, while maintaining responsible environmental stewardship.

These Guidelines, once adopted, will be made readily available (such as downloadable from the web) to proponents and stakeholders interested in municipal wastewater quality requirements. Proponents looking at upgrading their existing municipal wastewater infrastructure will use these guidelines to help them determine the requirements their upgrading should meet. Stakeholders interested in ensuring the Yukon's water resources are protected will be comforted knowing the government has appropriate wastewater objectives. These Guidelines will help provide clarity and certainty to proponents, regulators, other governments and stakeholders in other jurisdictions, and to Yukoners in general.

An application for a municipal water licence will be subject to the *Yukon Environmental and Socioeconomic Assessment Act (YESAA)*[3] prior to consideration by the Yukon Water Board. The Guidelines will recommend the minimum performance objectives for municipal wastewater treatment and discharge; however, the environmental review may recommend alternate standards, which may in turn be confirmed by the Water Board in a water licence.

All municipal waste discharges are required to comply with the *Waters Act (Yukon)*[4], *the Fisheries Act*[5], *the Canadian Environmental Protection Act 1999 (CEPA)*[6] and other relevant legislation and regulations. *CEPA* applies to wastewater discharges from facilities that discharge more than 5000 cubic meters per day to surface water. Yukon communities are presently not subject to *CEPA* due to sewage treatment methods and small community size. In the Canada Gazette (Dec. 4, 2004) it is stated that: "Environment Canada intends to use a regulation under the *Fisheries Act* as its principal implementation tool to achieve effluent standards for wastewater treatment systems equivalent in performance to conventional secondary treatment, with additional treatment where required." [7]

The Yukon guidelines will be revised from time to time to reflect changes in technology and new information on the impacts of wastewater discharge on the receiving environment. It also needs to be recognized that the Yukon, as a member of the Canadian Council of Ministers of Environment (CCME), is participating in the development of a Canada-wide Strategy for management of municipal wastewater effluents[8]. This strategy is due to be completed by March 2007 after a period of public consultation and will include harmonization of the regulatory framework, coordinated science and research, and an environmental risk model. The Yukon guidelines will be reviewed and possibly revised to reflect the results of the Canada-wide Strategy for the management of municipal wastewater effluent.

1. Objectives

The objectives are grouped according to the aspect of municipal wastewater discharge that they pertain to – Treatment; Conditions for Discharge to Surface Waters; Wastewater Quality Objectives; Monitoring and Sampling; and Contingency Planning. The scope of the guidelines has been kept narrow and the objectives are limited in order to focus on those key elements of wastewater discharge where specific guidance is required. Keeping the guidelines focused also preserves the Water Board's ability to exercise its own discretion in making decisions regarding the terms and conditions of a water use licence.

1.1. Treatment

As some municipal wastewater effluents have been identified as a source of harmful impacts on environmental and human health, wastewater treatment is meant to protect the use of receiving waters including groundwater. Hence, the objectives are to apply to treated discharges to surface water and that which may infiltrate to aquifers.

1.2. Conditions for Discharge to Surface Waters

In most cases in the territory, ongoing or part-time discharges to surface waters are to large aquatic systems and dilution is more than adequate. Intermittent lagoon discharges should normally be timed to coincide with high flows for additional protection.

In direct discharges to moving waters, it is best practice to have adequate diffusion mechanisms to ensure the most complete mixing in as short a time as possible. Any concentrated effluents should be diverted away from known fish passage areas (typically along water margins) and public use areas for obvious health reasons.

The CCME Canadian Environmental Quality Guidelines (CEQG) provides guidance on water quality standards for water uses including raw drinking water and freshwater fisheries.[9] Environmental assessors and the Water Board use these guidelines to protect downstream users. CCME guidelines continue to be the backdrop for objectives in receiving waters, and normally should be applied at an appropriate point where the effluent load is known to be well mixed. The guidelines chosen for consideration when determining specific effluent quality for project proposals would depend on the particular water uses and could include any combination of community water supplies, recreation/aesthetics, aquatic life and agricultural uses.

1.3. Wastewater Quality Objectives

In order to come up with appropriate wastewater quality objectives, the 1983 Water Board guidelines were reviewed as well as those from other comparable jurisdictions – these being the western provinces, NWT and Alaska[2,10]. The results of this review are presented in Table 1: Summary of Wastewater Quality Objectives in Yukon and Other Jurisdictions. The objectives proposed for Yukon are in the last row.

Table 1: Summary of Wastewater Quality Objectives in Yukon and Other Jurisdictions.

	Biochemical oxygen (mg/L)	**Total Suspended Solids (mg/L)**	**Oil + Grease (mg/L)**	**Fecal Coliforms (per 100 mL)**	**LC_{50} Standard**
Yukon Water Board Guidelines (1983)[1]	30 - 150	35 - 150	5	4,000 – 200,000	Yes
Environment Canada[2]	45	45	-	-	Yes
BC[3]	45	45	-	Dependent on use of receiving water	No
Alberta[4]	25	25	-	-	No
NWT[5]	30 - 120	35 - 180	No sheen	10,000 - 100,000	No
Alaska[6]	45 - 65	70	No sheen	20 - 40	No
Draft 2005 Guidelines[7]	45	60	No sheen	20,000	Under review

[1] Applicable number depends on dilution range (20:1 to>1,000:1)

[2] Numbers were proposed in personal communication with Environment Canada regarding Dawson water license limits and are subject to confirmation by Environment Canada.

[3] With a caveat that there are special circumstances where the LC_{50} standard applies, as cited in the 'Review of Yukon Water Board's Guidelines for Municipal Wastewater Discharges'. Draft December 16, 2003. G.J. Bull & Associates Inc. and Novatec Consultants Inc.

[4] These objectives are for communities of less than 20,000 people using a secondary mechanical plant. No standards are applied to lagoons with seasonal discharge.

[5] The NWT Water Board "Guidelines for the discharge of treated municipal wastewater in the Northwest Territories 1992" are for a range of dilutions from 10:1 to 1,000:1.

[6] Alaska limits are for varying sample intervals and communities less than 1,000.

[7] The applicability and methodology of toxicity testing (e.g., LC_{50}) is presently under review by Canada and the provinces/territories.

Dilution Ratio

The objectives proposed are based upon the 1983 standards using an effluent dilution ratio of 1:100. This is because all current municipal discharges are diluted to this level or better when entering rivers or lakes. The proposed objectives are also consistent with levels that are obtainable from conventional secondary treatment. In consideration of these two facts, the discharge of wastewater meeting these objectives is not anticipated to cause adverse effects on aquatic or terrestrial plant or animal life, their reproduction or habitat.

LC50

The issues of testing for and management of direct toxicity of municipal wastewater to aquatic life is under review by federal/provincial/territorial jurisdictions. Presently, compliance with section 36(3) of the *Fisheries Act*[5], regarding the prohibition for the deposit of a deleterious substance, relies on a standard fish bioassay called the 96-hour acute lethality test (96 hr LC_{50}). There is uncertainty about how this test may be applied in future pending a new federal fisheries regulation on municipal wastewater (anticipated once the Canada-wide Strategy is completed in 2007). Therefore, the draft Guidelines do not have a toxicity measure at this time, to allow for adequate resolution of the issue.

Large jurisdictions have a variety of communities and circumstances that do not occur in Yukon. British Columbia and Alberta have guidelines that have evolved over time to include special circumstances. Every licence or permit that is issued reflects the local and site-specific circumstances at the time. Municipal wastewater treatment is evolving in every jurisdiction with some communities having no facilities while others are achieving high standards. The proposed objectives are generally in line with the limits and ranges of other jurisdictions[2,10].

A review was also done of the wastewater quality limits in existing water licences for Yukon communities (see Table 2: Water License Wastewater Quality Limits for Yukon Municipalities).

Table 2: Water License Wastewater Quality Limits for Yukon Municipalities[1]

Community	Discharge to:	BOD_5 (mg/L)	TSS (mg/L)	Oil & Grease (mg/L)	Fecal Coliforms (#/100 mL)	LC50 Standard
Carmacks	Yukon River	45	60	5	100,000	Yes
Dawson	Yukon River	45	60	5	20,000	Yes
Faro[2]	Pelly River	45	60	5	20,000	Yes
Old Crow[3]	Porcupine River	-	-	-	-	No
Burwash[4]	Infiltration basin	15	15	Not Detectable	20,000	Yes
Destruction Bay[5]	Wetland	45	50	5	17,000,000	No
Haines Junction[6]	Wetland	20	25	15	400	Yes
Teslin[7]	Fox Creek	15	15	Not Detectable	200	Yes
Carcross	Ground	100	100	5	20,000	No
Ross River[8]	Ground	45			20,000	No
Watson Lake	Ground	45	60	5	20,000	No
Mayo	Ground	45	60	5	20,000	Yes
Whitehorse-Livingston Trail[9]	Ground	45	60	5	2,000	Yes
Whitehorse-Crestview	Ground	-	-	-	-	No
Eagle Plains	Ground	-	-	-	-	No
Whitehorse Cadet Camp	Ground	-	-	-	-	No
Dempster Hwy (km 4)	Ground	-	-	-	-	No
Beaver Creek	Ground	-	-	-	-	No
Marsh Lake	Ground	-	-	-	-	No
Draft 2005 Guidelines	Surface or ground water	45	60	No sheen	20,000	Under review

[1] G.J. Bull & Associates and NovaTec Consultants Inc. December 16, 2003.
[2] The Faro lagoon is discharged infrequently.
[3] Discharge is permitted to an unnamed creek between 1 September and 31 October. There are no standards applied to the discharge.
[4] Discharge from the wetland to the infiltration basin between is permitted only from 15 May and 30 September.
[5] The Destruction Bay sewage lagoon will be decommissioned when the Burwash lagoon becomes operational.
[6] The Haines Junction long-term storage lagoon was discharged in 1991 and 2001. Discharge may occur annually only after 1 August.
[7] The Teslin lagoon may be discharged to a wetland that discharges to Fox Creek and Teslin Lake between 1 June and 30 September.
[8] Ross River has not yet constructed the licensed system.
[9] Whitehorse can discharge the Livingston Trail facility to the Yukon River or the pothole lake with the same licence limits. There is a Yukon River mixing zone.

Table 2 illustrates that the proposed objectives are in line with the water license limits set by the Water Board for many Yukon municipalities. The proposed Guideline objectives are also the same as the limits set for the most recent municipal license issued by the Water Board, for the City of Dawson (2004). As the Water Board sets the limits based in part upon the input from interveners, it is likely that the proposed objectives will be in line with the current preferences of interested stakeholders.

1.4. Monitoring & Sampling

Sampling of discharge is usually simple, safe and can be automated. Sampling in the mixing zone requires special equipment and training, and is restricted to summer and winter conditions. For these reasons and the fact that the discharge pipe is usually the last point of control, the discharge pipe is usually identified as the wastewater quality compliance monitoring location.

Sampling should be frequent enough to assure both the operator and the inspector that discharges meet the objectives. Sewage lagoons and other high volume storage facilities may be sampled infrequently; however, mechanical systems with small volumes or frequent upsets should be sampled more frequently. Compliance sampling is the responsibility of the licence holder, although Inspectors may take confirmatory samples. The sampling strategies should be appropriate to the sewage treatment system and receiving waters.

The need for contingency plans is noted in the Water Board's Information sheet[11]. Contingency planning should be an important consideration from design to construction to operation.

References used or cited:

1. Guidelines for Municipal Wastewater Discharges in the Yukon Territory, March 1983. Yukon Territory Water Board.
2. Review of Yukon Water Board's Guidelines for Municipal Wastewater Discharges. Draft December 16, 2003. G.J. Bull & Associates Inc. and Novatec Consultants Inc.
3. *Yukon Environmental and Socioeconomic Assessment Act.*
4. *Waters Act* and Regulations.
5. *Fisheries Act*, Section 36(3).
6. *Canadian Environmental Protection Act, 1999* (CEPA).
7. Canada Gazette – Part 1, December 4, 2004, CEPA 1999. 'Guideline for the Release of Ammonia Dissolved in Water Found in Wastewater Effluents', Section 2 (Application, Page 3491) and Section 4 (Factors to consider, Page 3492).
8. Development of a Canada-wide Strategy for the Management of Municipal Wastewater Effluent Discussion Document, May 5, 2004, Canada Council of Ministers of the Environment.
9. Canadian Environmental Quality Guidelines, CCME, 2004.
10. Review of existing municipal wastewater effluent (MWWE) regulatory structures in Canada, Final report. Marbeck Resource Consultants, March 15, 2005. For CCME.
11. Information Sheet for Municipal or Municipal Sewage Undertakings, Yukon Water Board.

Related Contacts:

Agency or Group	Contact Information
Yukon Water Board	**867-456-3980** **www.yukonwaterboard.ca** **email: YWB@yukonwaterboard.ca**
Fisheries and Oceans Canada	**867-393-6722** **www.pac.dfo-mpo.gc.ca**
Environment Canada, Environmental Protection	**867-667-3400** **www.ec.gc.ca**
Canadian Council of Ministers of the Environment (CCME)	**www.ccme.ca/initiatives/water.html**
Environment Yukon Kevin McDonnell, Chief-Water Resources Bob Truelson, Manager-Water Quality	**www.environmentyukon.gov.yk.ca** **867-667-3145** **876-667-3217**